Instructions: 1. Write the question numbers legibly in the margin.
              2. Answer for the questions should be continuous.
              3. Only the first written answers will be considered for Part-A

TIME DURATION: 3hr 15 min   **MAX.MARKS: 80**

Instructions:
i) The question paper has 5 Parts A, B, C, D and E. Answer all the Parts.
ii) Part - A carries 20 marks, Part - B carries 12 marks, Part - C carries 15 marks, Part - D carries 25 marks and Part - E carries 8 marks.
iii) Write the question number properly as indicated in the question paper.

PART-A

I. Choose the correct answer (Each question carries 1 mark):   **5x1=5**

1. If A= $\begin{pmatrix} 1 & 2 & 4 \\ -1 & 3 & -2 \end{pmatrix}$ and B= $\begin{pmatrix} 3 & -4 & -1 \\ 1 & 5 & -2 \end{pmatrix}$ then, the value of A+B is

    a) $\begin{pmatrix} 4 & -2 & -3 \\ 0 & 6 & -4 \end{pmatrix}$ b) $\begin{pmatrix} 4 & -2 & 3 \\ 0 & 8 & -4 \end{pmatrix}$ c) $\begin{pmatrix} 4 & 2 & -3 \\ 0 & 8 & 4 \end{pmatrix}$ d) $\begin{pmatrix} -4 & -2 & -3 \\ 0 & 8 & -4 \end{pmatrix}$

2. If $P(A^1)=0.63$ then the value of $P(A)$ is
    a) 0.47   b) 0.47
    c) 0.73   d) 0.37

3. The fourth proportional of 4,5,24 is
    a) 30   b) 28   c) 32   d) 26

4. If $SinA=\frac{3}{5}$ then the value of Cos2A is

     a) $\frac{7}{25}$ b) $\frac{8}{25}$ c) $\frac{6}{25}$ d) $\frac{9}{25}$

5. The value of $\lim\limits_{x \to 1} \frac{x^3 +4}{1+ x}$ is   a) $\frac{5}{2}$ b) $\frac{2}{5}$ c) $\frac{6}{5}$ d) $\frac{9}{5}$

II. Match the following

6.   (i) The value of $\begin{vmatrix} 8 & 2 \\ 7 & -2 \end{vmatrix}$ a) $\frac{a}{b}$

        (ii)   If $^nC_8=^nC_{12}$ then the value of n   b)12

        (iii)If 5:20=3:x then the value of x   c)32

        (iv) $\lim\limits_{x \to 0}(\frac{Sinax}{bx})$ d)-30

        (v) If S= $t^3 - 6t^2 + 9t + 8$ then the initial velocity.   e)9

                                                     f)20

III For question numbers 7 to 11 choose the appropriate answer from the answers given below. (181440 ,

12, (pvr) $\Lambda \sim q$, $\frac{1}{2}(sin6A - sin2A), (p\Lambda r)\Lambda \sim q$, 720)   5 X 1 = 5

7. The number of arrangements that can be made with the letters of the word 'MONDAY' is _____
8. The number of of 10 different precious stones be set to form a necklace is_____
9. There are 4 routes to go from A to B and 3 routes to go from B to C then the number of ways to go from A to C via B is _____
10. The negation of "(pvr)→q" is_____
11. The sum or difference of trigonometric functions of Cos4A. Sin2A is_____

III. Answer the following questions.   (5 X 1 = 5)

12. Find the value of $\tan75^0$
13. If $\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 & 0 & -1 \\ 2 & 0 & -1 \\ 0 & 1 & -2 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ Find x, y, z.
14. Write the triplicate ratio of 3:5.
15. *Find the value of* $\int 2x(x^2 + 3)^2 dX$
16. Evaluate: $\int_0^1 \frac{e^x+1}{e^x} dx$

PART-B

IV Answer any SIX of the following questions.   (6 X 2 =12)

17. In how many ways can 6 people be chosen out of 10 people if one particular person is always included?
18. Find the number of triangles that can be formed out of 20 points in which 8 are collinear.
19. From a well shuffled pack of 52 cards, one card is drawn at random. Find the probability of getting either a king or a queen card.
20. Three numbers are in the ratio 2:3:4. If the sum of their squares is 1856. Find the numbers.
21. If 16 men can construct a house in 90 days then how many days will 15 men construct a similar house?
22. BD and BG on a certain bill due after sometime are Rs.1250 and Rs. 50 respectively. Find the face value of the bill?
23. Find the equation to a parabola with vertex (0,0), focus (0, -3) and directrix is y = 3.
24. Find focus, length of latus rectum of the parabola $y^2 =16x$
25. Evaluate: $\int_0^{\frac{\pi}{4}} sec^2 3x\ dx$
26. Evaluate: $\int_1^2 logx\ dX$
27. Find the area enclosed by the curve $y=x^2+2x$ between the ordinates x=0 and x=2

PART-C

V Answer any FIVE of the following questions.   (5 X 3 =15)

28. *If* $A = \begin{pmatrix} 2 & -1 \\ -1 & 2 \end{pmatrix}$ then show that $A^2 - 4A + 3I=0$ where I is an identity matrix of order 2x2 & 0 is a null matrix.
29. The banker's gain on a bill is $\frac{1}{9}$ th of the banker's discount, rate of interest being 10% per annum. Find the unexpired period of the bill.
30. Sanjana invests Rs.3240 in a stock at 108 and sells when the price falls to 104. How much stock at 130 can Sanjana buy now?

31. A shopkeeper bought a machine at a discount of 30% on the listed price of Rs. 24000. The shopkeeper offers a discount of 10% on listed price to the customer. If 10% VAT is levied, find (i) amount paid by the shopkeeper (ii) VAT to be paid by the shopkeeper.

32. If $x = at^2$ and $y = 2at$, then find $\frac{dy}{dx}$.

33. The volume of a spherical ball is increasing at the rate of 4π cc/sec. Find the rate of increase of the radius of the ball when the volume is 288π cc.

34. Evaluate: $\int \frac{3}{(x+1)(x+2)} dx$

PART-D

V Answer any FIVE of the following questions. (5 X 5 =25)

35. Solve the linear equations using the matrix method
$3x + y + 2z = 3, 2x - 3y - z = -3, x + 2y + z = 4$

36. Find the coefficient of x^{-7} in $\left(\sqrt{x} - \frac{4}{x^3}\right)^{21}$.

37. Resolve $\frac{x-1}{(x+2)^2(x+4)}$ into partial fractions.

38. Verify whether the proposition $(p \wedge \sim q) \wedge (\sim p \vee q)$ is a contradiction or not.

39. An aircraft manufacturer supplies aircraft engines to different airlines. They have just completed an initial order for 30 engines involving a total of 6000 direct labor hours at Rs. 20 per hour. They have been asked to bid for a prospective contract for a supply of 90 engines. It is expected that there will be 80% learning effect. Estimate the labor cost for the new order.

40. 55. Solve the LPP graphically: Maximize $Z = 6x + 8y$
Subject to constraints $4x + 2y \leq 20, 2x + 5y \leq 24$ $x, y \geq 0$

41. *Prove that* $\frac{(Sin5A+SinA)+(Sin4A+Sin2A)}{(Cos5A+CosA)+Cos4A+Cos2A)}$ =tan3A

42. Find the equation of the circle passing through the points (1, 1), (-2,2), (-6,0)

43. Evaluate: $\lim\limits_{x\to3} \left[\frac{x^2-9}{\sqrt{3x+7}-\sqrt{5x+1}}\right]$

PART-E

V Answer any TWO of the following questions. (2 X 4 =8)

44. The observer from the top of a cliff, observes the angles of depression of two boats in the same vertical plane are 30^0 and 45^0. If the distance between the boats is 100 meters, find the height of the cliff.

45. If $y = \left(x + \sqrt{x^2 + 1}\right)^m$, show that $(x^2 + 1)y_2 + xy_1 - m^2y = 0$.

46. The total revenue(R) and the total cost(C) function of a company are given by
R(Q) =300Q-Q^2 and C(Q)=20 +4Q find the equilibrium output.